

WHAT IS CLAIMED IS:

1. A filter, comprising a plurality of resonators, the resonators being coupled to one another by electromagnetic-field coupling,  
5 wherein non-adjacent resonators of said plurality of resonators are electrically coupled to each other with a series circuit formed of a capacitor and a transmission line.
2. The filter according to claim 1, wherein adjacent resonators of said  
10 plurality of resonators are electrically coupled to each other with a series circuit formed of a capacitor and a transmission line.
3. The filter according to claim 1, wherein the plurality of resonators and the transmission line are formed inside a dielectric body.  
15
4. A dielectric filter, comprising:  
a plurality of shield electrodes formed on outer faces of a dielectric body;  
resonator electrodes formed of at least three front end short-circuit  
20 1/4 wavelength transmission lines;  
a plurality of first transmission line electrodes, each of which has portions opposing respective portions of two adjacent resonator electrodes included in the resonator electrodes; and  
second transmission line electrodes having portions opposing the  
25 plurality of first transmission electrodes, respectively,  
wherein the resonator electrodes, the plurality of first transmission line electrodes, and the second transmission line electrodes are formed between the plurality of shield electrodes.
- 30 5. The dielectric filter according to claim 4, wherein the plurality of shield electrodes are connected to each other, and then are grounded.
6. The dielectric filter according to claim 4, wherein the dielectric filter includes capacitor electrodes formed of the first transmission lines opposing  
35 the resonator electrodes on outermost sides, and the capacitor electrodes are connected to side electrodes to form input/output terminals.

7. The dielectric filter according to claim 4, wherein capacitor electrodes are formed of the second transmission lines opposing open ends of the resonator electrodes and are grounded.

5 8. A laminated dielectric filter, comprising:  
a first dielectric layer;  
a second dielectric layer;  
a third dielectric layer;  
a fourth dielectric layer;  
10 a first shield electrode;  
a second shield electrode;  
resonator electrodes formed of at least three front end short-circuit  
1/4 wavelength transmission lines;  
a plurality of inter-stage coupling capacitor electrodes, each of  
15 which is formed of a transmission line having portions opposing respective  
portions of two adjacent resonator electrodes included in the resonator  
electrodes; and  
bypass electrodes formed of transmission lines having portions  
opposing the plurality of inter-stage coupling capacitor electrodes,  
20 respectively,  
wherein the first dielectric layer is laminated above the first shield  
electrode, the resonator electrodes are formed on an upper surface of the first  
dielectric layer, the second dielectric layer is laminated above the resonator  
electrodes, the inter-stage coupling capacitor electrodes are formed on an  
25 upper surface of the second dielectric layer, the third dielectric layer is  
laminated above the inter-stage coupling capacitor electrodes, the bypass  
electrodes are formed on an upper surface of the third dielectric layer, the  
fourth dielectric layer is laminated above the bypass electrodes, and the  
second shield electrode is positioned on an upper surface of the fourth  
30 dielectric layer.

9. The laminated dielectric filter according to claim 8, wherein the first  
shield electrode is provided on an upper surface of a fifth dielectric layer.

35 10. The laminated dielectric filter according to claim 8, further  
comprising a sixth dielectric layer laminated above the second shield  
electrode.

11. The laminated dielectric filter according to claim 8, wherein the first shield electrode and the second shield electrode are connected and then are grounded.
- 5 12. The laminated dielectric filter according to claim 8, further comprising capacitor electrodes formed of the transmission lines opposing the resonator electrodes on outermost sides,  
wherein the capacitor electrodes are connected to side electrodes to form input/output terminals.
- 10 13. The laminated dielectric filter according to claim 8, wherein capacitor electrodes are formed of transmission lines opposing open ends of the resonator electrodes and are grounded.
- 15 14. An antenna duplexer, comprising a filter including a plurality of resonators, the resonators being coupled to one another by electromagnetic-field coupling,  
wherein non-adjacent resonators of said plurality of resonators are electrically coupled to each other with a series circuit formed of a capacitor  
20 and a transmission line, and  
the filter is used as one of or both of filters on transmission and reception sides.
15. An antenna duplexer, comprising a dielectric filter including:  
25 a plurality of shield electrodes formed on outer faces of a dielectric body;  
resonator electrodes formed of at least three front end short-circuit  $1/4$  wavelength transmission lines;  
a plurality of first transmission line electrodes, each of which has  
30 portions opposing respective portions of two adjacent resonator electrodes included in the resonator electrodes; and  
second transmission line electrodes having portions opposing the plurality of first transmission electrodes, respectively,  
wherein the resonator electrodes, the plurality of first transmission  
35 line electrodes, and the second transmission line electrodes are formed between the plurality of shield electrodes, and  
the dielectric filter is used as one of or both of filters on transmission

and reception sides.

16. An antenna duplexer, comprising a laminated dielectric filter including:

- 5 a first dielectric layer;
- a second dielectric layer;
- a third dielectric layer;
- a fourth dielectric layer;
- a first shield electrode;
- 10 a second shield electrode;
- resonator electrodes formed of at least three front end short-circuit  $1/4$  wavelength transmission lines;
- a plurality of inter-stage coupling capacitor electrodes, each of which is formed of a transmission line having portions opposing respective
- 15 portions of two adjacent resonator electrodes included in the resonator electrodes; and

bypass electrodes formed of transmission lines having portions opposing the plurality of inter-stage coupling capacitor electrodes, respectively,

- 20 wherein the first dielectric layer is laminated above the first shield electrode, the resonator electrodes are formed on an upper surface of the first dielectric layer, the second dielectric layer is laminated above the resonator electrodes, the inter-stage coupling capacitor electrodes are formed on an upper surface of the second dielectric layer, the third dielectric layer is
- 25 laminated above the inter-stage coupling capacitor electrodes, the bypass electrodes are formed on an upper surface of the third dielectric layer, the fourth dielectric layer is laminated above the bypass electrodes, and the second shield electrode is positioned on an upper surface of the fourth dielectric layer, and

- 30 the laminated dielectric filter is used as one of or both of filters on transmission and reception sides.

17. Communication equipment, comprising a filter including a plurality of resonators, the resonators being coupled to one another by
- 35 electromagnetic-field coupling,

wherein non-adjacent resonators of said plurality of resonators are electrically coupled to each other with a series circuit formed of a capacitor

and a transmission line.

18. Communication equipment, comprising a dielectric filter including:  
a plurality of shield electrodes formed on outer faces of a dielectric  
5 body;

resonator electrodes formed of at least three front end short-circuit  
1/4 wavelength transmission lines;

a plurality of first transmission line electrodes, each of which has  
portions opposing respective portions of two adjacent resonator electrodes  
10 included in the resonator electrodes; and

second transmission line electrodes having portions opposing the  
plurality of first transmission electrodes, respectively,

wherein the resonator electrodes, the plurality of first transmission  
line electrodes, and the second transmission line electrodes are formed  
15 between the plurality of shield electrodes.

19. Communication equipment, comprising a laminated dielectric filter  
including:

a first dielectric layer;

20 a second dielectric layer;

a third dielectric layer;

a fourth dielectric layer;

a first shield electrode;

a second shield electrode;

25 resonator electrodes formed of at least three front end short-circuit  
1/4 wavelength transmission lines;

a plurality of inter-stage coupling capacitor electrodes, each of  
which is formed of a transmission line having portions opposing respective  
portions of two adjacent resonator electrodes included in the resonator  
30 electrodes; and

bypass electrodes formed of transmission lines having portions  
opposing the plurality of inter-stage coupling capacitor electrodes,  
respectively,

wherein the first dielectric layer is laminated above the first shield  
35 electrode, the resonator electrodes are formed on an upper surface of the first  
dielectric layer, the second dielectric layer is laminated above the resonator  
electrodes, the inter-stage coupling capacitor electrodes are formed on an

upper surface of the second dielectric layer, the third dielectric layer is laminated above the inter-stage coupling capacitor electrodes, the bypass electrodes are formed on an upper surface of the third dielectric layer, the fourth dielectric layer is laminated above the bypass electrodes, and the  
5 second shield electrode is positioned on an upper surface of the fourth dielectric layer.